

CLAIMS

1 1. A method for consolidating an earth stratum situated in a  
2 subgrade by withdrawing water from the subgrade comprising the  
3 steps of:  
4 a) placing a plurality of generally vertically positioned  
5 drainage strips in the earth stratum;  
6 b) connecting the drainage strips with a generally  
7 horizontally extended drainage means to provide water transfer  
8 between them;  
9 c) forming an air sealing layer directly over the  
10 generally horizontal drainage means and the closing of the  
11 surface of the soil;  
12 d) connecting the generally horizontal drainage means to  
13 a pump; and  
14 e) discharging fluid from the generally horizontal  
15 drainage means using the pump.

1 2. The method of claim 1, in which a trench is made from the  
2 ground surface and the vertical drainage strips extend downwardly  
3 from the bottom of the trench.

1 3. The method of claim 2, in which the trench is formed with  
2 a plough supported by a mobile carriage device and a vertical  
3 drainage strips are positioned during use by means of said device  
4 and the horizontal drainage means each time being arranged after  
5 that until the next vertical drainage strip has to be arranged.

1 4. The method of claim 3, in which simultaneously with the  
2 arrangement of the horizontal drainage means or immediately after  
3 that, the air sealing layer is being arranged by means of the  
4 device.

1 5. The method of claim 4, in which the air sealing layer is

2 arranged by removing soil material from the trench walls and  
3 arranging it on the horizontal drainage means.

1 6. The method of claim 4, in which the air sealing layer is  
2 arranged by arranging a sealing foil layer on the horizontal  
3 drainage means.

1 7. The method of claim 4, in which the air sealing layer is  
2 arranged by arranging a sealing layer of plastic material on the  
3 horizontal drainage means.

1 8. The method of claim 7 wherein the plastic material is  
2 bentonite.

1 9. The method of claim 5, 6 or 7, in which the air sealing  
2 layer is arranged by means of the device.

1 10. The method of claim 1 in which the trench is finally closed  
2 off with soil material up to approximately the original surface.

1 11. The method of claim 1 in which the vertical drainage strips  
2 are taken from a supply and after each strip has been arranged  
3 are separated by cutting through at a level above the trench  
4 bottom.

1 12. The method of claim 10, in which the cutting through takes  
2 place in the device.

1 13. A soil consolidation apparatus for consolidating a selected  
2 earth stratum, comprising:

3 a) movable carriage;

4 b) means for making a trench from the ground surface down  
5 to at least the upper side of the earth stratum to be

6 consolidated;  
7 c) means for the stepwise supplying of vertical drainage  
8 strips from a supply and driving each said strip into the earth  
9 stratum;  
10 d) means for supplying a horizontal drainage means in the  
11 trench bottom that is in fluid communication with the strips.

1 14. The soil consolidation apparatus of claim 13, in which the  
2 device is further provided with means for cutting through the  
3 drainage ribbon at a selected level above the trench bottom.

1 15. The soil consolidation apparatus of claim 14, in which the  
2 means for cutting through includes a movable blade and an anvil  
3 for said blade.

1 16. The soil consolidation apparatus of claim 15 in which the  
2 blade has been arranged on a first arm of a lever rotatable about  
3 a horizontal center line, a second arm of said lever being  
4 connected to a hydraulic cylinder.

1 17. The soil consolidation apparatus of claim 13 in which the  
2 trench-making means includes a plough.

1 18. The soil consolidation apparatus of claim 17, in which at  
2 its rear side the plough is provided with means for removing soil  
3 material from the trench walls and for pressing it downward.

1 19. The soil consolidation apparatus of claim 17 in which at its  
2 rear side the plough is provided with means for supplying the  
3 horizontal drainage means, from a supply roll.

1 20. The soil consolidation apparatus of claim 17 furthermore  
2 provided with means for pivoting the plough about a horizontal

3 axis of rotation, between a trench-making active position and an  
4 upwardly tilted moving position.

1 21. The method of claim 1, performed on a subaqueous soil.

1 22. A method for consolidating an earth stratum situated in a  
2 subgrade by withdrawing water from the subgrade, comprising the  
3 steps of:

4 a) drainage strips in the earth stratum;

5 b) connecting the drainage strips with a horizontal  
6 drainage placed in the upper area of the earth stratum;

7 c) establishing water transfer between the drainage strips  
8 and pipe;

9 d) forming an air sealing layer directly over the  
10 horizontal drainage pipe to close the surface of the soil;

11 e) withdrawing water with a connection of the horizontal  
12 drainage pipe to a pump that discharges water and air.

1 23. The method according to claim 22, in which a trench is made  
2 from the ground surface and the vertical drainage pipe is  
3 arranged from the bottom of the trench.

1 24. The method of claim 23, in which the trench is formed with  
2 a plough supported by a mobile carriage device and a vertical  
3 drainage strips are positioned during use by means of said device  
4 and the horizontal drainage means each time being arranged after  
5 that until the next vertical drainage strip has to be arranged.

1 25. The method of claim 24, in which simultaneously with the  
2 arrangement of the horizontal drainage means or immediately after  
3 that, the air sealing layer is being arranged by means of the  
4 device.

1 26. The method of claim 25, in which the air sealing layer is  
2 arranged by removing soil material from the trench walls and  
3 placing it on the horizontal drainage pipe.

1 27. The method of claim 25, in which the air sealing layer is  
2 arranged by placing a sealing foil layer on the horizontal  
3 rainage pipe.

1 28. The method according to claim 25, in which the air sealing  
2 layer is arranged by arranging a sealing layer of plastic  
3 material on the horizontal drainage means.

1 29. The method of claim 28 wherein the plastic material is  
2 bentonite.

1 30. The method of claim 26, 27 or 28, in which the air sealing  
2 layer is arranged by means of the device.

1 31. The method of claim 23 wherein the trench is closed off with  
2 soil material up to approximately the original earth's surface.

1 32. The method of claim 23 in which the drainage strips are  
2 taken from a supply and, after having been arranged, are  
3 separated by cutting through at a level above the trench bottom.

1 33. The method of claim 32 in which the cutting through takes  
2 place in the device.

1 34. A soil consolidation apparatus for consolidating a selected  
2 earth stratum comprising:

3 a) an earth working device provided with a propulsion  
4 system for moving the device in a horizontal direction over a

5 ground surface;  
6 b) the device having means for making a trench from the  
7 ground surface down to at least the upper side of the selected  
8 earth stratum to be consolidated,  
9 c) the device having means for the stepwise supplying of  
10 a drainage ribbons from a supply and for driving each ribbon into  
11 the selected earth stratum; and  
12 d) means for supplying a horizontal drainage in the trench  
13 bottom.

1 35. The apparatus according to claim 34, in which the device is  
2 further provided with means for cutting trough the drainage  
3 ribbon at a level above the trench bottom.

1 36. The apparatus according to claim 35, in which the means for  
2 cutting-through comprise a movable blade and an anvil for said  
3 blade.

1 37. The apparatus according to claim 36, in which the blade has  
2 been arranged on an arm of a lever rotatable about a horizontal  
3 center line, the other arm of said lever being connected to a  
4 vertically active hydraulic cylinder, preferably accommodated in  
5 the trench-making means.

1 38. The apparatus according to one of claims 34 - 37 in which  
2 the trench-making means form a plough.

1 39. The apparatus according to claim 38, in which at its rear  
2 side the plough is provided with means for removing soil material  
3 from the trench walls and for pressing it downward.

1 40. The apparatus according to claim 39, in which the plough is  
2 provided with means for making an incision in the trench walls

3 just below the line of engagement of the trench walls with the  
4 means for removing soil material from the trench walls.

1 41. The apparatus according to claim 38, 39, or 40 in which at  
2 its rear side the plough is provided with means for supplying the  
3 horizontal drainage means, particularly from a supply roll, in  
4 the trench.

1 42. The apparatus according to any one of the claims 38 - 41,  
2 furthermore provided with means for pivoting the plough about a  
3 horizontal axis of rotation, between a trench-making active  
4 position and an upwardly tilted moving position.

1 43. The method of claim 22 performed on a subaqueous soil.